Condensed Matter Physics

PHASE TRANSITIONAL PROPERTIES OF $Pb_{0.4}Sr_{0.6}TiO_3$ FILMS GROWN BY METALORGANIC DECOMPOSITION

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$PbTiO_3$-$SrTiO_3$ system has attracted considerable attention in microelectronics especially as a material used in capacitors of the ultra-large-scale-integrated dynamic random access memory cells due to its high dielectric constant and paraelectricity at normal operating temperatures. Recently, this system is also being investigated for its room temperature pyroelectric properties for possible night vision technology applications.

We have prepared $Pb_{0.4}Sr_{0.6}TiO_3$ films on platinum substrates by metalorganic decomposition method. Separate solutions of $PbTiO_3$ and $SrTiO_3$ were mixed to obtain the desired stoichiometry of the $Pb_{0.4}Sr_{0.6}TiO_3$ metalorganic solution. The films were prepared by dispensing the metalorganic solution onto Pt substrate (2 cm$\times$2 cm$\times$0.25mm) and spinning them at 4000 rpm for 15 seconds. Multiple coats were made in order to obtain the desired film thickness. Finally the films were annealed at 750^0C - 950^0C for one hour. X-ray diffraction analysis showed that the films are polycrystalline in nature with a perovskite crystal structure at room temperature. Dielectric constant was measured as a function of temperature, and the films show a phase transition temperature (Curie point) around 30^0C. These results together with the temperature dependence of the Raman spectra of the films will be presented.

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